

Complete Summary

GUIDELINE TITLE

Suspected cervical spine trauma.

BIBLIOGRAPHIC SOURCE(S)

Daffner RH, Dalinka MK, De Smet AA, El-Khoury GY, Kneeland JB, Manaster BJ, Morrison WB, Pavlov H, Rubin DA, Schneider R, Steinbach LS, Weissman BN, Haralson RH III, Hackney DB. Suspected cervical spine trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 8 p. [45 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American College of Radiology (ACR), Expert Panel on Musculoskeletal Imaging. Suspected cervical spine trauma. Reston (VA): American College of Radiology (ACR); 2002. 8 p. (ACR appropriateness criteria).

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

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SCOPE

DISEASE/CONDITION(S)

Suspected cervical spine trauma

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Emergency Medicine
Neurological Surgery
Neurology
Orthopedic Surgery
Pediatrics
Radiology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for suspected cervical spine trauma

TARGET POPULATION

Patients with suspected cervical spine trauma

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray
 - anteroposterior (AP), lateral, and open mouth
 - AP, lateral, open mouth, obliques
 - AP, lateral, open mouth, obliques, flexion/extension
2. Computed tomography (CT), with sagittal and coronal reformat
3. Computed tomography myelogram
4. Magnetic resonance imaging (MRI)

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a

consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

Concerns for cost containment and radiation exposure have led several investigators to study methods of improving selection of patients who truly are at risk and need radiographs or other imaging. The first such paper to address these issues was by Vandemark in 1990. He proposed a set of guidelines to identify patients at high risk for having a cervical spine injury. More recently is the study by Blackmore and colleagues at the University of Washington, who developed a new set of guidelines (decision rule) for the use of helical CT. In addition, they performed a cost-effectiveness analysis of using helical computed tomography (CT) in trauma patients. The most significant study in this respect was that by Stiell et al. Stiell was the lead investigator in formulating what is now accepted as the "Ottawa Rules" for selecting patients for ankle and knee radiography in the trauma setting. In a multi institution study, they present the "Canadian C-spine Rule" (see original guideline document) for selecting trauma patients for cervical radiography. The guidelines proposed by each of these studies are listed in the original guideline document under Supplementary Recommendations.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Suspected Cervical Spine Trauma

Variant 1: Adult: asymptomatic and alert, no cervical tenderness, no neurologic findings, no distracting injury, with or without cervical collar.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, cervical spine, AP, lateral, and open mouth	2	
X-ray, cervical spine, AP, lateral, open mouth, obliques	2	
X-ray, cervical spine, AP, lateral, open mouth, obliques, flexion/extension	2	
CT, cervical spine, with sagittal and coronal reformat	2	
MRI, cervical spine	2	
<p>Appropriateness Criteria Scale</p> <p>1 2 3 4 5 6 7 8 9</p> <p>1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Adult: asymptomatic and alert now, history of unconsciousness, no neurologic findings, no distracting injury.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, cervical spine, AP, lateral, and open mouth	2	
X-ray, cervical spine, AP, lateral, open mouth, obliques	2	
X-ray, cervical spine, AP, lateral, open mouth, obliques, flexion/extension	2	
CT, cervical spine, with sagittal and coronal reformat	2	
MRI, cervical spine	2	

Radiologic Exam Procedure	Appropriateness Rating	Comments
<p>Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Adult: alert, cervical tenderness, no neurologic findings, no distracting injury.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, cervical spine, AP, lateral, and open mouth	9	Only if CT not available.
CT, cervical spine, with sagittal and coronal reformat	9	Screening procedure of choice.
X-ray, cervical spine, AP, lateral, open mouth, obliques	1	
X-ray, cervical spine, AP, lateral, open mouth, obliques, flexion/extension	1	
MRI, cervical spine	1	
<p>Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Adult: alert, cervical tenderness, paresthesias in hands or feet.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, cervical spine, with sagittal and coronal reformat	9	Screening procedure of choice. For bony abnormalities.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, cervical spine	9	For cord or ligamentous injuries.
X-ray, cervical spine, AP, lateral, and open mouth	6	Only if CT not available.
X-ray, cervical spine, AP, lateral, open mouth, obliques	1	
X-ray, cervical spine, AP, lateral, open mouth, obliques, flexion/extension	1	
<p align="center">Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Adult: alert, no cervical tenderness, no neurologic findings, fractured femur.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, cervical spine, AP, lateral, and open mouth	2	Clinical evaluation to determine indication.
X-ray, cervical spine, AP, lateral, open mouth, obliques	2	
X-ray, cervical spine, AP, lateral, open mouth, obliques, flexion/extension	2	
CT, cervical spine, with sagittal and coronal reformat	2	
MRI, cervical spine	2	
<p align="center">Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 6: Adult: unconscious.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, cervical spine, with sagittal and coronal reformat	9	Screening procedure of choice.
MRI, cervical spine	9	If CT positive or if patient persistently unconscious (>48 hours).
X-ray, cervical spine, AP, lateral, and open mouth	6	Only if CT not available.
X-ray, cervical spine, AP, lateral, open mouth, obliques	1	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 7: Adult: impaired sensorium for <48 hours (including alcohol and/or drugs).

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, cervical spine, with sagittal and coronal reformat	9	Screening procedure of choice.
X-ray, cervical spine, AP, lateral, and open mouth	6	Only if CT not available.
X-ray, cervical spine, AP, lateral, and open mouth, obliques	1	
MRI, cervical spine	1	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9		

Radiologic Exam Procedure	Appropriateness Rating	Comments
1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 8: Adult: impaired sensorium for >48 hours (including alcohol and/or drugs).

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, cervical spine, with sagittal and coronal reformat	9	Screening procedure of choice.
MRI, cervical spine	9	If CT positive or if patient persistently unconscious (>48 hours.)
X-ray, cervical spine, AP, lateral, and open mouth	6	Only if CT not available.
X-ray, cervical spine, AP, lateral, open mouth, obliques	1	
CT myelogram	1	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 9: Adult: impaired sensorium (alcohol and/or drugs), neurologic findings.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, cervical spine, with sagittal and coronal reformat	9	Screening procedure of choice. For bony abnormalities.
MRI, cervical spine	9	For cord or ligamentous injuries.
X-ray, cervical spine,	6	Only if CT not available.

Radiologic Exam Procedure	Appropriateness Rating	Comments
AP, lateral, and open mouth		
X-ray, cervical spine, AP, lateral, open mouth, obliques	1	
CT myelogram	1	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 10: Adult: neck pain, clinical findings suggest ligamentous injury, radiographs and/or CT "normal."

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, cervical spine	9	Procedure of choice.
X-ray, cervical spine, flexion/extension radiographs	1	Not useful in the acute stage. May be good for follow-up for delayed instability.
CT myelogram	1	
Appropriateness Criteria Scale 1 2 3 4 5 6 7 8 9 1 = Least appropriate 9 = Most appropriate		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 11: Child: alert, no neck pain, neck supple, no distracting injury.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, cervical spine, AP, lateral, and open mouth	2	
CT, cervical spine, with sagittal and	2	

Radiologic Exam Procedure	Appropriateness Rating	Comments
coronal reformat		
<p>Appropriateness Criteria Scale</p> <p>1 2 3 4 5 6 7 8 9</p> <p>1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 12: Child: alert, no neck pain, neck supple, fractured femur.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, cervical spine, AP, lateral, and open mouth	2	
CT, cervical spine, with sagittal and coronal reformat	2	
<p>Appropriateness Criteria Scale</p> <p>1 2 3 4 5 6 7 8 9</p> <p>1 = Least appropriate 9 = Most appropriate</p>		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Evaluation of patients with suspected cervical spine trauma is one of the most controversial topics in medicine today. The problem is not merely one of radiology, but touches all specialties-emergency medicine, trauma surgery, orthopedics, and neurosurgery. In the past decade, there have been a large number of reports in the medical literature dealing with this problem. The controversy swirls around several questions: 1) which patients need imaging, 2) how much imaging is necessary, and 3) exactly what sort of imaging is to be performed. Fueling the controversy is pressure from insurers and the federal government for cost containment. Conservative estimates in the literature indicate that more than one million blunt trauma patients who have the potential for sustaining a cervical spine injury are seen in emergency departments in the United States each year.

The original literature review for this ACR Appropriateness Criteria™ topic included the initial investigations of 5,719 patients with cervical trauma. The literature review for this revision included data on 13,534 patients. In addition, there are data from the National Emergency X-Radiography Utilization Study (NEXUS) of 34,069 patients and from the Canadian Rule group of 8,924 patients.

In recent years, there has been a profound change in the way in which patients suspected of having cervical spine injuries are evaluated. Foremost among this change has been a significant body of evidence within the radiologic literature supporting a more prominent role for CT as a screening tool for these patients. Initial reports in the early 1990s, demonstrated how much more efficient helical CT was in identifying fractures. These conclusions were supported by those of other investigators, who validated the initial observations in larger scale studies. In recent years, articles have appeared in the trauma surgical literature advocating the use of multidetector CT (MDCT) instead of radiography. This has led to radiography being relegated to either a secondary role for evaluating not only patients suspected of cervical spine injury but also those with injuries of the thoracic and lumbar areas.

A further result of the changing atmosphere has been a reversal on opinions on cervical trauma radiography by one author, a longtime advocate of the six-view series. In the first of two recent studies, times for examination in patients who underwent a six-view radiographic examination were recorded. The average was 22 minutes; 79% of patients required repeat of one or more of the views. The most commonly repeated view was the open-mouth atlantoaxial view. In the second study recording the times for helical CT (non-MDCT) evaluation, the average was found to be 12 minutes—a significant time interval in the trauma setting. This author now advocates MDCT as the primary screening technique supplemented by lateral radiographs only to assess C-2. However, radiography should not be completely abandoned, in his opinion. The panel agrees and has concluded that MDCT, and not radiography, be the primary screening study. In addition, they recommend that the three-view radiographic study be performed only when CT is not available. Furthermore, the panel recommends that sagittal and coronal multiplanar reconstruction from the axial CT images be performed for all studies to provide additional planes necessary for diagnosis of vertebral injuries.

Concerns for cost containment and radiation exposure have led several investigators to study methods of improving selection of patients who truly are at risk and need radiographs or other imaging. The first such paper to address these issues was by Vandemark in 1990. He proposed a set of guidelines to identify patients at high risk for having a cervical spine injury. More recently is the study by Blackmore and colleagues at the University of Washington, who developed a new set of guidelines (decision rule) for the use of helical CT. In addition, they performed a cost-effectiveness analysis of using helical CT in trauma patients. The most significant study in this respect was that by Stiell et al. Stiell was the lead investigator in formulating what is now accepted as the "Ottawa Rules" for selecting patients for ankle and knee radiography in the trauma setting. In a multi institution study, they present the "Canadian C-spine Rule" (see original guideline document) for selecting trauma patients for cervical radiography. The guidelines proposed by each of these studies are listed in the original guideline document under Supplementary Recommendations.

The use of any of these guidelines must be with the caveat that a thorough clinical evaluation of the patient should be performed before ordering imaging studies of the cervical spine. To use those guidelines blindly in a "protocol-driven" manner will result in many unnecessary studies being performed. An example would be the patient who is alert, has no cervical tenderness, and who has a large bone

(femur) fracture. By the Vandemark criteria this patient would seemingly be at high risk because of a distracting injury. However, in such patients who are not only alert but show no evidence of sensorial impairment from injury, alcohol, or drugs, a clinical evaluation should be performed to determine whether there is any neck pain or tenderness. It is the consensus of the panel that clinical evaluation may lower the patient's risk level and eliminate the need for cervical imaging.

Summary and Recommendations

There is agreement among most investigators and this expert panel that patients who are alert, have never lost consciousness, are not under the influence of alcohol or drugs, have no distracting injuries, have no cervical tenderness, and have no neurologic findings, do not need imaging. Patients who do not fall into this category should undergo an MDCT examination that includes sagittal and coronal multiplanar reconstructed images. In most instances, the cervical CT examination will be performed immediately after a cranial CT, while the patient is still in the CT suite. This is both time-effective and cost-effective. Patients who have symptoms referable to the upper cervical spine after undergoing a negative CT examination should have a single lateral radiograph to evaluate C2. This is particularly important in patients over age 65, who have a higher incidence of C2 fractures. For those patients who are unable to be examined by CT, a three-view radiographic examination of the cervical vertebrae may be performed. In order for CT to be a successful screening examination for cervical spine trauma, the radiologist must ensure that the study is performed with proper technique and interpreted with strict attention to detail. When a fracture is not present, subtle findings in the surrounding soft tissues, alignment, and interrelationships among anatomic structures may be the only clues to the presence of a potentially serious, unstable injury.

Although the literature still recommends flexion/extension radiographs, it is the opinion and experience of this expert panel that they are not very helpful, particularly in the acute trauma setting. Usually muscle spasm in acutely injured patients precludes an adequate examination in the acute setting. Flexion/extension radiography is best reserved for follow-up of symptomatic patients, usually in 7 to 10 days after muscle spasm has subsided. They are particularly helpful for ensuring that minor degrees of anterolisthesis or retrolisthesis in patients with cervical spondylosis are fixed deformities. If there is concern that the patient has ligamentous instability, MRI is the procedure of choice, and not flexion/extension radiography or dynamic fluoroscopy.

Similarly, the panel members agree that the use of supine oblique views is no longer necessary in patients who are undergoing cervical MDCT examination. Oblique views, although useful in patients with unilateral facet lock, are most valuable in adding two more views of the cervicothoracic junction. Both of these functions can now be accomplished with MDCT.

Finally, there is agreement in the literature that MRI should be reserved for patients who have clinical evidence of spinal cord injury and those suspected of ligamentous instability. In addition, the panel recommends MRI be used to "clear" the cervical spine in patients who remain unconscious after 48 hours, assuming the CT examination is normal. Of note is a recent article by authors who studied

366 patients with MDCT and MRI for instability, and found negative predictive values of 99% for ligament injury and 100% for unstable cervical spine injury, respectively. They conclude that MRI for obtunded patients may not be needed. Finally, with a thought toward future investigation is the recent review article that recommended total spinal MRI to screen for multiple noncontiguous injuries (which occurs in about 20% of patients). The next review by this panel will address these subjects as additional research becomes available.

Abbreviations

- AP, anteroposterior
- CT, computed tomography
- MRI, magnetic resonance imaging

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with suspected cervical spine trauma

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical

consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Daffner RH, Dalinka MK, De Smet AA, El-Khoury GY, Kneeland JB, Manaster BJ, Morrison WB, Pavlov H, Rubin DA, Schneider R, Steinbach LS, Weissman BN, Haralson RH III, Hackney DB. Suspected cervical spine trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 8 p. [45 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1995 (revised 2005)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Musculoskeletal Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American College of Radiology (ACR), Expert Panel on Musculoskeletal Imaging. Suspected cervical spine trauma. Reston (VA): American College of Radiology (ACR); 2002. 8 p. (ACR appropriateness criteria).

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).

ACR Appropriateness Criteria® Anytime, Anywhere™ (PDA application). Available from the [ACR Web site](#).

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on May 6, 2001. The information was verified by the guideline developer as of June 29, 2001. This summary was updated by ECRI on May 22, 2003. The updated information was verified by the guideline developer on June 23, 2003. This summary was updated by ECRI on March 21, 2006.

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